



Log No. 190

TAG Revision 8/13/21

STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Washington State Energy Code Development Standard Energy Code Proposal Form

Code being amended: ☒ Commercial Provisions ☐ Residential Provisions

Code Section # C403.7.1

Brief Description:

Replace current C403.7.1 with new section which removes energy recovery exception and reduces and reconfigures various thresholds. The intent is that DCV applies to all single zone systems (DOAS or other) that provide ventilation. Additionally, the intent is that a DOAS system larger than 1500 cfm that provides ventilation to more than one space also requires DCV (unless exceptions apply).

Also, adds specific requirements for DCV. Gas sensors are required in spaces and systems are required to have VSD control or as allowed modulated dampers.

Proposed code change text: (Copy the existing text from the Integrated Draft, linked above, and then use underline for new text an

C403.3.5.1 Energy recovery ventilation with DOAS. The DOAS shall include *energy recovery ventilation*. The energy recovery system shall have a 60 percent minimum sensible recovery effectiveness or have 50 percent enthalpy recovery effectiveness in accordance with Section C403.7.6. For DOAS having a total fan system motor nameplate hp less than 5 hp, total combined fan power shall not exceed 1 W/cfm of outdoor air. For DOAS having a total fan system motor hp greater than or equal to 5 hp, refer to fan power limitations of Section C403.8.1. This fan power restriction applies to each dedicated outdoor air unit in the permitted project, but does not include the fan power associated with the zonal heating/cooling equipment. The airflow rate thresholds for energy recovery requirements in Tables C403.7.6(1) and C403.7.6(2) do not apply.

Exceptions:

- ~~1. Occupied spaces with all of the following characteristics: complying with Section C403.7.6, served by equipment less than 5000 cfm, with an average occupant load greater than 25 people per 1000 square feet (93 m²) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) that include demand control ventilation configured to reduce outdoor air by at least 50% below design minimum ventilation rates when the actual occupancy of the space served by the system is less than the design occupancy.~~
2. Systems installed for the sole purpose of providing makeup air for systems exhausting toxic, flammable, paint, or corrosive fumes or dust, dryer exhaust, or commercial kitchen hoods used for collecting and removing grease vapors and smoke.

C403.7.1 Demand control ventilation.

C403.7.1.1 Spaces requiring demand control ventilation. Demand Control Ventilation (DCV) shall be provided for either of the following:

1. Spaces with ventilation provided by single-zone systems, ~~and~~.

2. Spaces with an occupant load greater than or equal to 15 people per 1000 square feet (93 m²) of floor area or with an occupant outdoor airflow rate greater than or equal to 15 cfm/person (as established in Table 403.3.1.1 of the International Mechanical Code)

Exceptions to Item 2:

1. Spaces where more than 75 percent of the space design outdoor airflow is required for makeup air that is exhausted from the space or transfer air that is required for makeup air that is exhausted from other spaces.
2. Spaces with one of the following occupancy classifications as defined by Table 403.3.1.1 of the International Mechanical Code: Correctional cells, educational laboratories, barbers, beauty and nail salons, and bowling alley seating.
3. Spaces with a design occupant component **outside** airflow less than:
 - i. 50 cfm (23.6 l/s), or
 - ii. 100 cfm (47.2 l/s) with system having energy recovery with **minimum** 60% sensible effectiveness.

Occupant outside airflow component shall be calculated as the product of space area, and the design occupant density and outdoor airflow rate per occupant (*R_p*) as established in Table 403.3.1.1 of the International Mechanical Code.

4. Spaces with ventilation not provided by a single-zone system where the total system design outdoor airflow is less than:
 - i. 750 cfm (354 L/s), or
 - ii. 1500 cfm (708 L/s) with system having energy recovery with **minimum** 60% sensible effectiveness.

C403.7.1.2 Demand control ventilation controls. Each space required to have demand control ventilation shall have a CO2 sensor. Controls shall be capable of and configured to automatically:

1. Change the quantity of outdoor air supplied to the space based upon the CO2 sensor, and
2. Adjust the system outdoor air intake from peak design levels in response to changes in outdoor air required in the spaces served by the system. This adjustment shall be accomplished by variable speed fan control.

Exception to item 2: Systems designed to recirculate return air and systems with total supply air less than 1500 cfm may use other means of modulating outdoor air.

C503.4.4 Controls for cooling equipment replacement. When space cooling equipment is replaced, controls shall comply with all requirements under Section C403.3.5 and related subsections, and Section C403.5.1. for integrated economizer control. Single-zone systems providing ventilation where the equipment containing the supply fans is replaced shall also comply with Section C403.7.1.

Purpose of code change:

Achieve energy savings by requiring DCV in many more cases and update language. Proposal will require DCV control in many more spaces and systems. Spaces served by systems with heat recovery will no longer be exempt. Space size thresholds are changed from floor area to the people component cfm of outdoor air. Systems without economizer will have to start providing DCV down to 750 cfm or 1500 cfm with heat recovery rather than the current 3000cfm.

The room size thresholds are derived from 90.1-2019 addendum b. First, the 90.1-2019 addendum b room size thresholds were reduced until the savings (scaled by area) and cost (fixed) were just cost effective in the OFM calculator including the price of carbon. This resulted in rooms sizes 57% smaller than 90.1-2019. In addition, the 90.1-2019 criteria of occupant outdoor air component in cfm / 1000sf was simplified to occupant outdoor air flow in cfm.

Your amendment must meet one of the following criteria. Select at least one:



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- | | |
|--|---|
| <input type="checkbox"/> Addresses a critical life/safety need. | <input type="checkbox"/> Consistency with state or federal regulations. |
| <input type="checkbox"/> The amendment clarifies the intent or application of the code. | <input type="checkbox"/> Addresses a unique character of the state. |
| <input checked="" type="checkbox"/> Addresses a specific state policy or statute.
(Note that energy conservation is a state policy) | <input type="checkbox"/> Corrects errors and omissions. |

Check the building types that would be impacted by your code change:

- | | | |
|--|---|---|
| <input type="checkbox"/> Single family/duplex/townhome | <input type="checkbox"/> Multi-family 4 + stories | <input checked="" type="checkbox"/> Institutional |
| <input type="checkbox"/> Multi-family 1 – 3 stories | <input checked="" type="checkbox"/> Commercial / Retail | <input type="checkbox"/> Industrial |

Your name	Mike Kennedy	Email address	mikekennedy@energysims.com
Your organization	Mike Kennedy, Inc	Phone number	3603010098
Other contact name Nick O'Neil – 971-544-7211			

Instructions: Send this form as an email attachment, along with any other documentation available, to: sbcc@des.wa.gov. For further information, call the State Building Code Council at 360-407-9278.

Economic Impact Data Sheet

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants and businesses.

Increased control and equipment costs and decreasing operating costs. Cost and savings are based upon 90.1-2019 addendum b (completed and published 4/1/2021). Room and system size thresholds are scaled down to account for OFM calculator assumptions and carbon.

https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20addenda/90_1_2019_b_20210401.pdf

Provide your best estimate of the construction cost (or cost savings) of your code change proposal? (See OFM Life Cycle Cost [Analysis tool](#) and [Instructions](#); use these [Inputs](#). **Webinars on the tool can be found [Here](#) and [Here](#)**)

Show calculations here, and list sources for costs/savings, or attach backup data pages

90.1-2019 addendum b estimated the cost to be \$300 per zone plus \$63 (PV) for replacing half the sensors during the 15 year measure life.

Provide your best estimate of the annual energy savings (or additional energy use) for your code change proposal?

90.1-2019 modeled the energy savings and found savings of 108kWh and 75 therms for a 2 zone model. For the cost, savings of 47kWh and 33 therms (for two zones) were found to be cost effective in the OFM calculator. This was used to scale the room size thresholds and represents the savings of the measure as proposed.

OFM calculator assuming 2 zones

Life Cycle Cost Analysis		BEST		
Alternative	Baseline	Alt. 1	Alt. 2	
Energy Use Intensity (kBtu/sq.ft)	#DIV/0!	#DIV/0!		
1st Construction Costs	\$ -	\$ 600	\$ -	-
PV of Capital Costs	\$ -	\$ 1,481	\$ -	-
PV of Maintenance Costs	\$ -	\$ 272	\$ -	-
PV of Utility Costs	\$ 44,741	\$ 43,561	\$ -	-
Total Life Cycle Cost (LCC)	\$ 44,741	\$ 45,314	\$ -	-
Net Present Savings (NPS)	N/A	\$ (573)	\$ -	-

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost		BEST		
GHG Impact from Utility Consumption	Baseline	Alt. 1	Alt. 2	
Tons of CO2e over Study Period	348	338	-	
% CO2e Reduction vs. Baseline	N/A	3%	103%	
Present Social Cost of Carbon (SCC)	\$ 22,085	\$ 21,474	\$ -	-
Total LCC with SCC	\$ 66,826	\$ 66,788	\$ -	-
NPS with SCC	N/A	\$ 38	\$ -	-

List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

No additional time for review but will require training. A table can be generated with the minimum room size required for DCV based upon the IMC ventilation table or the code drawings can be required to state the people component cfm to each space.

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.